

ID AAR79949 standard; Protein; 772 AA.
XX
AC AAR79949;
XX
DT 24-APR-1996 (first entry)
XX
DE Enzyme M-11.
XX
KW Enzyme; M-11; Q36; rhizobium; arthrobacter; trehalose;
KW amylaceous saccharide.
XX
OS Rhizobium sp. M11.
XX
FH Key Location/Qualifiers
FT Misc-difference 502..506
FT /note= "used for production of probe sequence
FT (AAT04206)" Misc-difference 621..625
FT /note= "used for production of probe sequence
FT (AAT04207)"
XX
PN EP674005-A2.
XX
PD 27-SEP-1995.
XX
PF 23-FEB-1995; 95EP-0301176.
XX
PR 06-APR-1994; 94JP-0090728.
PR 23-FEB-1994; 94JP-0047940.
PR 23-FEB-1994; 94JP-0047956.
PR 06-APR-1994; 94JP-0090705.
XX
PA (HAYB) HAYASHIBARA SEIBUTSU KAGAKU.
XX
PI Kubota M, Maruta K, Sugimoto T, Tsusaki K;
XX
DR WPI; 1995-329870/43.
DR N-PSDB; AAT04155.
XX
PT DNA encoding enzyme reduces amylaceous saccharide to produce
PT non-reducing sugar with trehalose end gp. - useful in foods,
PT cosmetics, pharmaceuticals, etc.
XX
PS Claim 3; Page 21-22; 178pp; English.
XX
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CC a trehalose end group, from a reducing amylaceous saccharide. The
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CC enzyme Q36 (see AAT04156), which was obtained from Arthrobacter sp. Q36.
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CC for trehalose. The advantages with using these sugars, are that, they
 CC are practically non-reducing (so no browning reaction occurs when they
 CC are heated with proteins), have a mild but good quality sweetness,
 CC adequate viscosity and moisture-retaining properties.
 XX
 SQ Sequence 772 AA;

Query Match 54.8%; Score 2150; DB 16; Length 772;
 Best Local Similarity 56.9%; Pred. No. 6e-168;
 Matches 435; Conservative 90; Mismatches 227; Indels 12; Gaps 7;

Qy 1 PASTYRLQISAEFTLFDAARIVPYLHRLGADWLYLSPLLESESGSSHGYDVVDHSRVDA 60
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 Db 4 pastyrlqirrgftlfdaaetvpylkslgvdiylspilkaesgsdhgydvt dpavvdpe 63

Qy 61 RGGPEGLAELSRAAHERGMGVVVDIVPNHVG VATPKANRWWVDVLARGQRSEYADYFDID 120
 ||||| :|:| |||:|||||||:| | || :| |: | || |:|
 Db 64 rggpeglaavskaargagmgvldivpnhvgvasppqnpwwsllkegrgspyavafdv 123

Qy 121 WEFGGRLRLPVLGDGPDELDALRVDGDELVYYEHRFP I AEGT--GGGTPREVHDRQH YE 178
 |: |||:|:| ||| :| | : || ||:||||:|:| | :|:| |||||
 Db 124 wdlaggriripvl g-sddldqleikdgelr yydhrfplaegsyrdgdspqdv hgrqhye 182

Qy 179 LMSWRRADHD LNYRRFFAVNTLAAVRVEDPRVFDDTHREIGRWIAEGLVDGLRVDHPDGL 238
 |: ||||:||||||| ||| :|| | ||: |:|: || || ||||:|||||
 Db 183 ligwrradnelnyrrffavntlagirvevppvfdeahqevvrwfragladglridhpdgl 242

Qy 239 RAPGDYLRRLAELAQGRPIWVEKIIEGDERMPPQWPIAGTTGYDALAGIDRVLVDPAGEH 298
 | ||:| |: | : :||:| |:| : ||||| :|| | || |:|
 Db 243 adpegylkr lrevtggaylliekilepgeqlpasfecegttg ydaladvdrvfvdprgqv 302

Qy 299 PLTQI-VDEAAGSPRRWAE LVPERKRAVARGILNSEIRRVARELGEVAG----DVEDALV 353
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 Db 303 pldrldarlrggapadyedmirgtkr r itdgil hseilrlarlvpeqtgipgeaaadaia 362

Qy 354 EIAAALS VYRSYLPFGREHLDEAVAAAQAAAPQLEADLAAVGAALADPGNPAALRFQOTS 413
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 Db 363 eiiaafpvysylpegaeilkeacdlaarr r pelgqtvql lqpllldtleisrrfqts 422

Qy 414 GMIMAKGVEDNAFYRYPRLTSLTEVGGDPSLFAIDAAAFHAAQRDRAARLPESMTTLTTH 473
 ||:||||| ||:| || :||| ||: |:| || | | || ||||:|
 Db 423 gmv makgvedtaffrynrlgtltevgadptef slepee fhrmarrqaelplsm t t l s t h 482

Qy 474 DTKRSEDTRARITALAEAPERWRRFLTEVGG LIGTGDRVLENLIWQAIVGAWPASRERLE 533
 |||||:|:| | :| : | | | |:| ||||| |||||:
 Db 483 dtkrsedtrarisviaevapewekaldr lntlapl pdgplstllwqaiagawpasrerlq 542

Qy 534 AYALKAAREAGESTDWIDGDPAFEERLTRLVTVAVEEPLVHELLERLVDELTAAGYSNGL 593
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 Db 543 syalkaareagntswtdpd pafeealsavvdsafdnpevraelealvgllaphgasnsl 602

Qy 594 AAKLLQLLAPGTPDVYQGTERWDRSLVDPNRRPVDFAAASELLDRLDGGWRPPVDETGA 653
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 Db 603 aaklvqltmpgvpdvyqgtefwd rsltdpnrrpfsfaeriral dqldaghrpdsfqdea 662

Qy 654 VKTLVVSRA LRRLRRDRPELFTAYHPVTARGAQAEHLIGFDR--GGAIALATRLPLGLAAA 711

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Db	663	vkllvtsralrlrrnrpelftgyrphargpaaghlvafdraggvlalatrpygleqs 722
Qy	712	GGWGDTVVDVGERSLRDELGTGRE-ARGAARVAELFADYPVALLV 754
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Db	723	ggwrtdavel-eaamtdeltgstfgpgpaalsevfraypvallv 765

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 FT (AAT04206)" Misc-difference 621..625
 FT /note= "used for production of probe sequence
 FT (AAT04207)"
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 PF 23-FEB-1995; 95EP-0301176.
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 PR 23-FEB-1994; 94JP-0047940.
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XX

SQ Sequence 772 AA;

Query Match 100.0%; Score 35; DB 16; Length 772;

Best Local Similarity 100.0%; Pred. No. 18;

Matches 6; Conservative 0; Mismatches 0; Indels 0; Gaps 0;

Qy 1 DIVPNH 6

|||||

Db 87 divpnh 92

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 OS Rhizobium sp. M11.
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 FH Key Location/Qualifiers
 FT Misc-difference 502..506
 FT /note= "used for production of probe sequence
 FT (AAT04206)" Misc-difference 621..625
 FT /note= "used for production of probe sequence
 FT (AAT04207)"
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 PN EP674005-A2.
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 PD 27-SEP-1995.
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 PF 23-FEB-1995; 95EP-0301176.
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 PR 06-APR-1994; 94JP-0090728.
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XX

SQ Sequence 772 AA;

Query Match 100.0%; Score 35; DB 16; Length 772;

Best Local Similarity 100.0%; Pred. No. 52;

Matches 6; Conservative 0; Mismatches 0; Indels 0; Gaps 0;

Qy 1 GTTGYD 6

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Db 281 gttgyd 286

ID AAR79950 standard; Protein; 775 AA.
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 AC AAR79950;
 XX
 DT 24-APR-1996 (first entry)
 XX
 DE Enzyme Q36.
 XX
 KW Enzyme; M-11; Q36; rhizobium; arthrobacter; trehalose;
 KW amylaceous saccharide.
 XX
 OS Arthrobacter sp. M11.
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 FH Key Location/Qualifiers
 FT Misc-difference 120..125
 FT /note= "used for production of probe sequence
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 FT /note= "used for production of probe sequence
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 PN EP674005-A2.
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 PD 27-SEP-1995.
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 PF 23-FEB-1995; 95EP-0301176.
 XX
 PR 06-APR-1994; 94JP-0090728.
 PR 23-FEB-1994; 94JP-0047940.
 PR 23-FEB-1994; 94JP-0047956.
 PR 06-APR-1994; 94JP-0090705.
 XX
 PA (HAYB) HAYASHIBARA SEIBUTSU KAGAKU.
 XX
 PI Kubota M, Maruta K, Sugimoto T, Tsusaki K;
 XX
 DR WPI; 1995-329870/43.
 DR N-PSDB; AAT04156.
 XX
 PT DNA encoding enzyme reduces amylaceous saccharide to produce
 PT non-reducing sugar with trehalose end gp. - useful in foods,
 PT cosmetics, pharmaceuticals, etc.
 XX
 PS Claim 3; Page 23-25; 178pp; English.
 XX
 CC This sequence represents an enzyme that forms a non-reducing sugar with
 CC a trehalose end group, from a reducing amylaceous saccharide. The
 CC amylaceous saccharides have a degree of glucose polymerisation of 3 or
 CC higher. This sequence was extracted from a liquid culture of
 CC Arthrobacter species Q36. By using an oligonucleotide probe based on a
 CC fragment of the enzyme sequence, the DNA encoding sequence was obtained.
 CC The encoding sequence was then ligated into a vector and used to produce
 CC M-11 in E.coli transformants. This can also be performed for the DNA
 CC encoding enzyme M-11 (see AAT04155), which was obtained from Rhizobium
 CC sp. M-11. The non-reducing sugars produced by the action of these
 CC enzymes can be used in foods, cosmetics, pharmaceuticals and feeds. They
 CC are used as sweeteners, taste and quality improvers, stabilisers,
 CC fillers, excipients and adjuvants. The sugars can also be used as

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CC when they are heated with proteins), have a mild but good quality
CC sweetness, adequate viscosity and moisture-retaining properties.

XX

SQ Sequence 775 AA;

Query Match 75.5%; Score 74; DB 16; Length 775;

Best Local Similarity 75.0%; Pred. No. 6.8e-05;

Matches 15; Conservative 1; Mismatches 4; Indels 0; Gaps 0;

Qy 1 PASTYRLQISAEFTLFDAAR 20

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Db 4 pvstyrlqirkgftlfdaak 23

L6 ANSWER 13 OF 17 HCAPLUS COPYRIGHT 2001 ACS

ACCESSION NUMBER: 1994:573949 HCAPLUS

DOCUMENT NUMBER: 121:173949

TITLE: Non-reducing saccharide-forming **enzyme**, and its purification from microorganisms, its uses

INVENTOR(S): Maruta, Kazuhiko; Sugimoto, Toshiyuki; Kubota, Michio; Miyake, Toshio

PATENT ASSIGNEE(S): Kabushiki Kaisha Hayashibara Seibutsu Kagaku Kenkyujo, Japan

SOURCE: Eur. Pat. Appl., 42 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 606753	A2	19940720	EP 1993-310386	19931221
EP 606753	A3	19950614		
EP 606753	B1	19990721		
R: AT, BE, CH, DE, DK, ES, FR, GB, IT, LI, MC, NL, PT, SE				
EP 691344	A1	19960110	EP 1995-201789	19931221
R: AT, BE, CH, DE, DK, ES, FR, GB, IT, LI, MC, NL, PT, SE				
AT 182359	E	19990815	AT 1993-310386	19931221
ES 2136115	T3	19991116	ES 1993-310386	19931221
IL 123389	A1	19990922	IL 1993-123389	19931222
AU 9352721	A1	19940707	AU 1993-52721	19931223
AU 681861	B2	19970911		
CA 2112423	AA	19940629	CA 1993-2112423	19931224
CN 1091470	A	19940831	CN 1993-121744	19931228
JP 07143876	A2	19950606	JP 1993-349216	19931228
CN 1105067	A	19950712	CN 1994-107243	19940627
US 6017899	A	20000125	US 1996-769143	19961218
US 5922580	A	19990713	US 1997-941553	19970930

PRIORITY APPLN. INFO.:

JP 1992-362131	A	19921228
JP 1993-265416	A	19930930
EP 1993-310386	A3	19931221
IL 1993-108144	A	19931222
IL 1993-119549	A3	19931222
US 1993-172707	A3	19931227
US 1995-412865	A3	19950329
US 1995-487396	A1	19950607

AB Disclosed is a novel non-reducing saccharide-forming **enzyme**, and its prepn. and uses. The **enzyme** is obtainable from the culture of microorganisms such as Rhizobium sp. M-11 (FERM BP 4130) and Arthrobacter sp. Q36 (FERM BP-4316), and is capable of forming non-reducing saccharides contg. a trehalose structure when allowed to act on reducing partial starch hydrolyzates. Glucoamylase and .alpha.-glucosidase readily yield trehalose when allowed to act on the non-reducing saccharides. These non-reducing saccharides and trehalose are extensively useful in food products, cosmetics, and pharmaceuticals. Using the Rhizobium **enzyme**, non-reducing saccharides were prepd. from malto-oligosaccharides. In mice, these non-reducing saccharides displayed LD50 values of .gtoreq.50 g/kg. Many other microorganisms were shown to produce the **enzyme**, but Rhizobium and Arthrobacter produced 5-10-fold more **enzyme** than the other species. Partial amino acid sequences of the Rhizobium and Arthrobacter **enzymes** were detd. Use of the non-reducing saccharides prepd. with the **enzyme** in foods, cosmetics, and pharmaceuticals was demonstrated.

L10 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2001 ACS

RN 34620-76-3 REGISTRY

CN D-Glucose, O-.alpha.-D-glucopyranosyl-(1.fwdarw.4)-O-.alpha.-D-glucopyranosyl-(1.fwdarw.4)-O-.alpha.-D-glucopyranosyl-(1.fwdarw.4)-O-.alpha.-D-glucopyranosyl-(1.fwdarw.4)- (9CI) (CA INDEX NAME)

OTHER CA INDEX NAMES:

CN **Maltopentaose (6CI, 7CI, 8CI)**

OTHER NAMES:

CN Amylopentaose

AR 1668-09-3

FS STEREOSEARCH

DR 7322-28-3, 125527-30-2, 142431-24-1

MF C30 H52 O26

CI COM

LC STN Files: AGRICOLA, ANABSTR, BEILSTEIN*, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CAOLD, CAPLUS, CBNB, CHEMCATS, CHEMLIST, CIN, CSCHEM, DETHERM*, EMBASE, IFICDB, IFIPAT, IFIUDB, MEDLINE, NAPRALERT, PROMT, TOXLINE, TOXLIT, USPATFULL

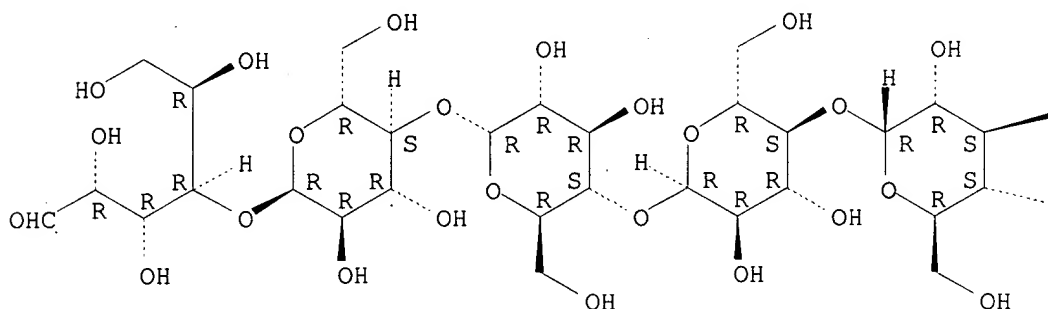
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Other Sources: DSL**, EINECS**

(**Enter CHEMLIST File for up-to-date regulatory information)

Absolute stereochemistry.

PAGE 1-A



PAGE 1-B

OH

OH

701 REFERENCES IN FILE CA (1967 TO DATE)
32 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
703 REFERENCES IN FILE CAPLUS (1967 TO DATE)
28 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

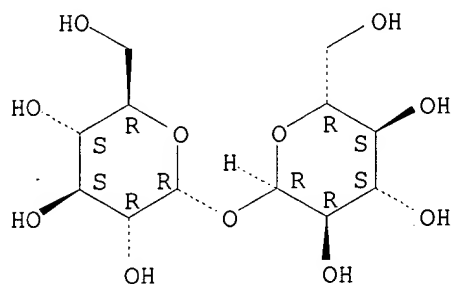
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L1 1 TREHALOSE/CN

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L1 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2001 ACS
RN 99-20-7 REGISTRY
CN .alpha.-D-Glucopyranoside, .alpha.-D-glucopyranosyl (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN **Trehalose (8CI)**
OTHER NAMES:
CN .alpha.,.alpha.'-D-Trehalose
CN .alpha.,.alpha.-Trehalose
CN .alpha.-D-Trehalose
CN .alpha.-Trehalose
CN D-(+)-Trehalose
CN D-Trehalose
CN Ergot sugar
CN Mycose
CN Natural trehalose
CN Treha
CN Trehaose
FS STEREOSEARCH
DR 229966-89-6
MF C12 H22 O11
CI COM
LC STN Files: AGRICOLA, AIDSLINE, ANABSTR, BEILSTEIN*, BIOBUSINESS, BIOSIS,
BIOTECHNO, CA, CABA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB, CEN,
CHEMCATS, CHEMLIST, CIN, CSCHEM, DDFU, DETHERM*, DRUGU, EMBASE, GMELIN*,
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SPECINFO, TOXLINE, TOXLIT, TULSA, USPATFULL
(*File contains numerically searchable property data)
Other Sources: DSL**, EINECS**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)

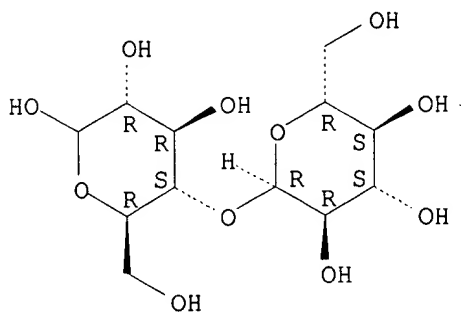
Absolute stereochemistry. Rotation (+).



4466 REFERENCES IN FILE CA (1967 TO DATE)
257 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
4480 REFERENCES IN FILE CAPLUS (1967 TO DATE)
64 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

L1 ANSWER 1 OF 2 REGISTRY COPYRIGHT 2001 ACS
RN 16984-36-4 REGISTRY
CN D-Glucopyranose, 4-O-.alpha.-D-glucopyranosyl- (8CI, 9CI) (CA INDEX NAME)
OTHER NAMES:
CN **Maltose**
PR 69-79-4
FS STEREOSEARCH
DR 47297-42-7
MF C12 H22 O11
CI COM
LC STN Files: BEILSTEIN*, BIOSIS, BIOTECHNO, DETHERM*, EMBASE, SPECINFO,
VTB
(*File contains numerically searchable property data)

Absolute stereochemistry.



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 PR 23-FEB-1994; 94JP-0047956.
 PR 06-APR-1994; 94JP-0090705.
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Matches 11; Conservative 0; Mismatches 3; Indels 0; Gaps 0;

Qy 1 SLVDPDNRRPVDF 14

|| ||||| ||

Db 627 sltdpdnrrpfsfa 640

AAR79949

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FH Key Location/Qualifiers

FT Misc-difference 502..506

FT /note= "used for production of probe sequence

FT (AAT04206)" Misc-difference 621..625

FT /note= "used for production of probe sequence

FT (AAT04207)"

XX

PN EP674005-A2.

XX

PD 27-SEP-1995.

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PF 23-FEB-1995; 95EP-0301176.

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PR 06-APR-1994; 94JP-0090728.

PR 23-FEB-1994; 94JP-0047940.

PR 23-FEB-1994; 94JP-0047956.

PR 06-APR-1994; 94JP-0090705.

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PA (HAYB) HAYASHIBARA SEIBUTSU KAGAKU.

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PI Kubota M, Maruta K, Sugimoto T, Tsusaki K;

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DR WPI; 1995-329870/43.

DR N-PSDB; AAT04155.

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PT DNA encoding enzyme reduces amylaceous saccharide to produce
PT non-reducing sugar with trehalose end gp. - useful in foods,
PT cosmetics, pharmaceuticals, etc.

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PS Claim 3; Page 21-22; 178pp; English.

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CC This sequence represents an enzyme that forms a non-reducing sugar with
CC a trehalose end group, from a reducing amylaceous saccharide. The
CC amylaceous saccharides have a degree of glucose polymerisation of 3 or
CC higher. This sequence was extracted from a liquid culture of Rhizobium
CC species M-11. By using an oligonucleotide probe based on a fragment of
CC this sequence, the encoding sequence was obtained. The encoding
CC sequence was then ligated into a vector and used to produce M-11 in
CC E.coli transformants. This can also be performed for the DNA encoding
CC enzyme Q36 (see AAT04156), which was obtained from Arthrobacter sp. Q36.
CC The non-reducing sugars produced by the action of these enzymes can be
CC used in foods, cosmetics, pharmaceuticals and feeds. They are used as
CC sweeteners, taste and quality improvers, stabilisers, fillers,

CC excipients and adjuvants. The sugars can also be used as intermediates
CC for trehalose. The advantages with using these sugars, are that, they
CC are practically non-reducing (so no browning reaction occurs when they
CC are heated with proteins), have a mild but good quality sweetness,
CC adequate viscosity and moisture-retaining properties.

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SQ Sequence 772 AA;

Query Match 50.0%; Score 60; DB 16; Length 772;

Best Local Similarity 52.9%; Pred. No. 0.53;

Matches 9; Conservative 2; Mismatches 6; Indels 0; Gaps 0;

Qy 2 NRWWWDVLARGQRSEYA 18

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Db 101 npwwsllkegrgspya 117